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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/642,667	08/19/2003	Yoshihiro Satoh	03186-1/2002-239455	3481
21254	7590	12/03/2004	EXAMINER	
MCGINN & GIBB, PLLC 8321 OLD COURTHOUSE ROAD SUITE 200 VIENNA, VA 22182-3817			NOVACEK, CHRISTY L	
			ART UNIT	PAPER NUMBER
			2822	

DATE MAILED: 12/03/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

# Office Action Summary

Application No.

10/642,667

Applicant(s)

SATOH, YOSHIHIRO

Examiner

Christy L. Novacek

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

## Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

## Status

- 1) ☒ Responsive to communication(s) filed on 19 August 2003.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

## Disposition of Claims

- 4) ☒ Claim(s) 1-10 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-10 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

## Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

## Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some \* c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.

## Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
Paper No(s)/Mail Date 8/19/03.
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_\_.

### **DETAILED ACTION**

This office action is in response to the communication filed August 19, 2003.

#### ***Specification***

The specification is objected to as failing to provide proper antecedent basis for the claimed subject matter. See 37 CFR 1.75(d)(1) and MPEP § 608.01(o). Correction of the following is required:

Claims 4 and 9 recite the limitations of forming the first and second insulator films of a “silicon nitride” and a “silicon oxide”. However, the specification states that the first insulator film is a “nitride” (not *silicon* nitride) and the second insulator film is an “oxide” (not a *silicon* oxide).

#### ***Claim Objections***

Claims 1 and 6 are objected to because of the following informalities:

The next to last line in claims 1 and 6 recite the limitation of “said side-wall *oxide* film”. There is insufficient antecedent basis for this limitation.

Applicant is advised that should claims 1-5 be found allowable, claims 6-10 will be objected to under 37 CFR 1.75 as being a substantial duplicate thereof. When two claims in an application are duplicates or else are so close in content that they both cover the same thing, despite a slight difference in wording, it is proper after allowing one claim to object to the other as being a substantial duplicate of the allowed claim. See MPEP § 706.03(k).

Appropriate correction is required.

#### ***Claim Rejections - 35 USC § 103***

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The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1-3, 5-8 and 10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Saito (US 6,235,620) in view of Araki (JP 2000-0371277, cited in IDS).

Regarding claims 1 and 6, Saito discloses depositing a metallic conductive film (8m) on an underlying insulating film (7), consecutively depositing first (12a) and second (12b) insulator films on the metallic conductive film, patterning the first and second insulator films to have substantially the same patterned area, patterning the metallic conductive film by using the first and second insulator films as an etching mask, depositing a third insulator film (13) on the first and second insulator films and the underlying insulating film, etching back the third insulator film to configure a side-wall film covering the patterned metallic conductive film, and depositing a fourth insulator film (16/17/18) to embed therein the side-wall film on the underlying oxide film. Saito does not disclose selectively etching the second insulator film to configure the second insulator film to have a smaller width than that of the first insulator film. Like Saito, Araki discloses process of forming closely spaced metallic lines on a semiconductor substrate, forming a cap layer on the lines, and depositing insulator fill material in between the lines. Araki teaches that it is beneficial to etch the top (cap) layer on the metallic lines to narrow its width prior to depositing the insulator fill material because by providing a rounded top to the lines, the fill material can be deposited into the narrow areas between adjacent lines without the formation of voids. At the time of the invention, it would have been obvious to one of ordinary skill in the

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art to etch the second insulator layer of Saito such that it has a smaller width than that of the first insulator layer because Araki teaches that by providing a rounded top to the lines, the fill material can be deposited into the narrow areas between adjacent lines without the formation of voids.

Regarding claims 2 and 7, by modifying the lines of Saito as taught by Araki, the side-wall film will have a tapered mesa structure having a larger width toward a bottom thereof.

Regarding claims 3 and 8, Saito discloses conducting the steps of etching the fourth insulator film to form therein a contact hole by using the side-wall film as an etch stopper and forming a contact plug (21) in the contact hole after the step of depositing the fourth insulator layer.

Regarding claims 5 and 10, Saito discloses fabricating a semiconductor memory device.

Claims 4 and 9 are rejected under 35 U.S.C. 103(a) as being unpatentable over Saito in view of Araki as applied above, and further in view of the admitted prior art.

Regarding claims 4 and 9, Saito discloses that the first insulator layer is silicon oxide and the second insulator layer is silicon nitride. These layers are formulated so as to have etch selectivity between them. The admitted prior art discloses that it is conventional in the art to form capping layers of metal lines such that the first insulator layer is silicon nitride and the second insulator layer is silicon oxide. At the time of the invention, it would have been obvious to one of ordinary skill in the art to use any conventional materials to comprise the first and second insulator films so long as they provide etch selectivity to one another because it is well-known in the art that these materials are functional equivalents.

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***Conclusion***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Christy L. Novacek whose telephone number is (571) 571-1839. The examiner can normally be reached on Monday-Thursday and alternate Fridays 7:30 - 5:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Amir Zarabian can be reached on (571) 272-1852. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

CLN  
November 24, 2004

  
**AMIR ZARABIAN  
SUPERVISORY PATENT EXAMINER  
TECHNOLOGY CENTER 2800**